

WMA
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## **WATER MANAGEMENT ACT PROGRAM**

### **Guidance Document and Forms For a Water Audit**

#### **General**

A Water Audit identifies how much water is lost and what that loss costs the public water supplier. Records and system-control equipment (such as meters) are thoroughly checked for accuracy. The overall goal of the Water Audit is to help the public water supplier select and implement programs to reduce the water works system losses.

The Water Audit should be performed annually by the public water supplier. In this manner, the public water supplier will determine the volume of lost water; the need to do regular field leak detection and; the dollar value of water that is lost. Water audits allow for adjustments to be made to metering system calculations and acceptable meter errors.

#### **Forms for a Water Audit**

There are six (6) forms used in the preparation of a Water Audit that are included in this document. All utilize gallons as input data. An explanation of these forms is as follows:

Form 1 - Uncorrected Total Water Supply from Sources of Supply Master Meter Readings - This form is used to summarize pumping records from sources of supply for the most recent three (3) years.

Form 2 - Uncorrected Customer Meter Records - This form is used to summarize metered readings for individual users for the most recent three (3) years.

Form 3 - Pumping and Treatment Costs - This form outlines the average base pumping and treatment costs from the sources of supply.

Form 4 - Source Meter Error Adjustments to the Total Amount of Water Supplied to the System - This form takes water source meter errors determined after calibration to adjust known gallonage errors.

Form 5 - Distribution System Large Service Meter Adjustments - This form provides a gallonage adjustment to large distribution system meter errors, after calibration.

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Form 6 - Water Audit Worksheet - This form is the worksheet that summarizes water losses and costs associated with unaccounted for water, based on information derived on Forms 1 through 5.

## **Forms**

This section outlines the input of data in order to obtain an accurate unaccounted for water percentage and costs associated with those losses to the public water supplier. All records should be utilized during the same twelve (12) month time period.

## **Water Audit Worksheet or Form 6**

Form 6 is utilized to record and compute corrections to the water works systems metering components. Please follow the following format and record all computations on **Form 6**.

## **Review of Production and Sale Records**

- a. Review production records to tabulate the volume of water received from all sources of supply for the most recent three (3) years and complete **Form 1**.
- b. Calculate an average of the three (3) most recent yearly totals from Form 1 and enter **on Line 1, Form 3 and on Line 1 on Form 6**.
- c. Review customer meter records to determine the total quantity of water sold and unsold for the past three (3) years and enter on **Form 2**.
- d. Calculate an average of the three (3) most recent yearly Totals from Form 2 and enter on **line 4 on Form 6**.
- e. Estimate the amount of water sold but not metered for the past 3 years, and enter this figure on **Form 2, Line c**. Divide Line c by 3 and enter this average on **Line 6 on Form 6**,

## **Pumping and Treating Costs - Form 3**

- a. Review purchasing records for the past 3 years to determine the total and average chemical, fuel, electricity, water purchase, and other costs to pump and treat water. Enter these figures on **Form 3**. Then perform the calculations indicated in the lower section of **Form 3**.

Enter results on **line 15 on Form 6**.

**Massachusetts Department of Environmental Protection**  
**Bureau of Resource Protection – Annual Statistical Report**  
**2005 Water Management Act Program Annual Report Form**  
*For Public Water Suppliers-Reporting Period 1/1/2005 – 12/31/2005*

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- b. If water is purchased from another entity(s), please determine the volume using the format below, and enter on **Line 2 - Form 3**.

No.	Year	Annual Volume	Annual Volume	Total
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____

Total \_\_\_\_\_ divide by 3 and enter  
on **Line 2 - Form 3**

### **Source Meter Errors**

Source Meters: any meter (venturi, etc.) that records flow from sources of supply.

List in tabular form the types, locations, frequency of calibration and calibration program for the water supply system source meters.

Source meters should be calibrated to verify the accuracy through standard field testing, pitometer or other reliable methods. Testing should include evaluation of the primary device and the meter registration unit. For venturi's - calibration should be performed twice a year. All other meters should be tested as outlined in AWWA specifications or WMAP permit requirements for meter testing time periods.

Form 4 should be completed for all source meters to report adjustments resulting from source water meter errors for the past 3 years. Divide total adjustments for the past 3 years by 3 to calculate average source meter adjustments. This average source water meter adjustment, in gallons, should be entered on **Form 6 on- line 2a**.

### **Evaluation of System Components**

Provide an explanation that outlines the program that the water works system utilizes to evaluate system components such as valves that provide: pressure relief, altitude control on storage tanks, pressure reducing, and surge relief.

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If a documented estimate of volume of water can be made from faulty operating conditions, this gallonage should be entered on **Line 2b on Form 6.**

<u><b>Type of Device</b></u>	<u><b>Total Volume</b></u>	<u><b>How Documented</b></u>
------------------------------	----------------------------	------------------------------

- |    |  |  |
|----|--|--|
| 1. |  |  |
| 2. |  |  |
| 3. |  |  |

**Total**

**Unmetered Authorized Uses of Water**

If there are unmetered but authorized uses of water, this annual estimate should be entered on **Line 9 on Form 6.** These uses include:

<u><b>Type of Unmetered Uses</b></u>	<u><b>Annual Volume</b></u>	<u><b>How Documented</b></u>
1. Fire fighting and training		
2. Bleeders		
3. Watermain flushing		
4. Storage Tank Overflows		
5. Public Construction Uses		
a. Sewer System Maintenance		
b. Street Cleaning		
c. Construction		
d. Other _____		

<b>Total Volume</b>		Enter on <b><u>Line 9 on Form 6</u></b>
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Water used by municipal buildings and schools, golf courses, public cemeteries, and municipal pools should be metered or otherwise be determined to be Unaccounted-for Water.

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### **Unmetered Miscellaneous Losses of Water**

Provide an estimate of unmetered miscellaneous losses attributed to bleeders, unauthorized connections, backwash waters and theft. Enter this figure on **Line 10 on Form 6.**

### **Distribution System Large Service Meter Errors**

Form 5 should be completed for all **distribution system large service** meters to report adjustments resulting from large in line meter errors for the past 3 years. Divide total adjustments for the past 3 years by 3 to calculate average source meter adjustments. This average large service meter meter adjustment, in gallons, should be entered on **Form 6 on line 5a.**

### **Accounting Systems**

A Certified Public Accountant (CPA) could review billing and accounting procedures. The entire accounting procedure should be evaluated including meter reading frequency, printing of billing statements, cash flow improvements, water rates and all systems that are related to producing accurate and timely water bills.

Adjustments to water sales that reflect any error made in billing and accounting procedures should be entered on **Line 5b on Form 6.**

Please provide a written statement on how adjustments were determined and attach to the water audit.

### **Completion of Water Audit**

The Water Audit - Form 6 should be completed and the quantity of water calculated as unaccounted-for water (UAW). The forms should be evaluated to determine areas that need attention and prioritization for water works system improvements.

The submittal should include the water meter testing procedures and certification for each calibrated metering system and appended to the report, if available.